A

IN THE CLAIMS

Please amend the claims as follows:

1. (currently amended) A method for the detection and treatment of disordered breathing during sleep employing an artificial neural network (ANN) in which data related to breathing gas flow are analyzed, comprising:

placing a mask with a tube over a patient's airway, the mask being in communication with a source of a pressurized breathing gas controlled by a continuous positive airway pressure (CPAP) system, thereby establishing a respiratory circuit;

periodically sampling the gas flow in the circuit;

~~periodically calculating values for one or several parameters distinctive of various breathing patterns;~~

~~periodically feeding said parameter values to an ANN trained to recognize breathing patterns characteristic of sleep-disordered breathing;~~

~~analyzing said parameter values in the neural network;~~

performing a linear predictive coding (LPC) multiple parameter analysis for each sample to provide thereby respective A-parameters;

converting said A-parameters into cepstrum parameters;

processing said cepstrum parameters using an ANN trained to recognize breathing patterns characteristic of sleep disordered breathing; and

controlling ~~pressurized breathing gas supply~~a breathing gas pressure in response to ~~the~~an output ~~from~~of said ANN.

2. (original) The method of claim 1, where in said parameter values are fed to the network at a frequency of from 2 Hz to 30 Hz.

3. (original) The method of claim 2, wherein said parameter values are fed to the network at a frequency of about 20 Hz.

4. (original) The method of claim 1, wherein said parameters comprise cepstrum coefficients, energy slope, difference in trend.

a

5. (original) The method of claim 1, wherein the ANN has been trained with data collected from a large number of patients.

6. (original) The method of claim 1, wherein the ANN has been trained with data collected from patients during a particular stage of sleep.

A1

7. (original) The method of claim 1, wherein the ANN has been trained with data collected from patients resting in a particular body position during sleep.

8. (original) The method of claim 1, wherein the ANN has been trained with data collected from patients being under influence of drugs including alcohol during sleep.

9. (original) The method of claim 1, wherein the ANN has been trained with data collected from patients by use of a polysomnography system.

10. (original) The method of claim 1, wherein the ANN comprises a number of nodes representing sets of training data.

11. (original) The method of claim 1, wherein the ANN is a Kohonen map~~Kohonen-map type~~ ANN.

12. (original) The method of claim 11, comprising a structure of data stored in a non-volatile memory.

13. (original) The method of claim 12, wherein the non-volatile memory is comprised by an auto CPAP.

14. (original) The method of claim 11, wherein the ANN comprises areas representing initial stages of apnea.

15. (original) The method of claim 14, wherein a closed trajectory characteristic of the breathing pattern of the patient is made to pass through the ANN and is analyzed in

a

regard of its geometric relationship to said areas representing initial stages of apnea, the passage of said trajectory through such area or touching such area being indicative of a disturbed breathing pattern and being used to control the ACPAP so as to increase the amount of air provided to the patient to restore normal breathing.

16. (original) The method of claim 15, wherein the additional amount of air adduced to restore normal breathing is reduced upon a normal breathing pattern having been re-established.

17. (original) The method of claim 11, comprising the use of linear predictive coding to analyze the parameter values fed to the ANN.

18. (original) The method of claim 17, wherein, in said linear predictive coding analysis, so-called A-parameters from the analysis are converted to cepstrum parameters for optimal correlation between parameter distance and conceptual distance.

19. (currently amended) The method of claim 11, wherein ~~the~~ prediction error in calculating linear predictive coding is used as a basis for determining the parameter value next in line.

20. (original) The method of claim 19, wherein said prediction error is filtered to counteract short-term variations, and is normalized with the total energy of the analytical window.

21. (currently amended) An apparatus for the detection and treatment of disordered breathing during sleep for use with a CPAP, the apparatus including a probe for sampling ~~breathing~~<u>at least inhalation</u> air flow data, ~~in particular on inhalation,~~ and an artificial neural network (ANN) for analyzing, ~~directly or indirectly,~~ said data to control <u>thereby a</u> breathing air pressure<u>, said probe periodically sampling said air flow, said ANN processing cepstrum parameters generated by converting A-parameters</u>

associated with a linear predictive coding (LPC) analysis performed for each of said samples.

22. (original) The apparatus of claim 21, wherein the ANN is a Kohonen map-type ANN.

A1

23. (currently amended) An automatic continuous positive airways pressure apparatus (ACPAP) comprising a probe for sampling breathing air flow data and an artificial neural network (ANN) for analyzing, ~~directly or indirectly,~~ said data to control thereby a breathing air pressure, said probe periodically sampling said air flow, said ANN processing cepstrum parameters generated by converting A-parameters associated with a linear predictive coding (LPC) analysis performed for each of said samples.

24. (original) The apparatus of claim 23, wherein the ANN is a Kohonen map-type ANN.

20 ~~25~~. (currently amended) A method of treating sleep disorder breathing, the method comprising the steps of:

placing an interface over a patient's airway, the interface coupled to a source of pressurized gas;

measuring a respiration-related variable in the interface to derive therefrom corresponding cepstrum parameters;

~~inputting~~providing said cepstrum data to ~~from the respiration-related variables into~~ an artificial neural network trained to recognize patterns characterizing sleep disorder breathing; and

responsive to recognition by the artificial neural network of sleep disorder breathing, supplying pressurized gas to the patient's airway through the interface.

26. (canceled)

22 ~~27~~. (original) The method according to claim 21 ~~25~~ further comprising the step of:

a

comparing a number of outputs of the artificial neural network over a selected interval to a selected threshold value and indicating sleep disorder breathing only if the number of outputs of the artificial neural network indicative of sleep disorder breathing exceeds the selected threshold value.

A1

23 ~~28~~. (currently amended) The method according to claim 21 ~~25~~ further comprising the step of normalizing the measured respiration-related variable prior to ~~inputting~~providing them ~~into~~to the artificial neural network.

24 ~~29~~. (original) The method according to claim 21 ~~25~~ wherein the respiration-related variable is the pressure in the interface.

30. (canceled)

31. (canceled)

32. (canceled)

33. (canceled)

34. (canceled)

25 ~~35~~. (original) A method of treating sleep disorder breathing, the method comprising the steps of:

placing an interface over a patient's airway, the interface coupled to a source of pressurized gas;

periodically sampling pressure in the interface;

periodically inputting cepstrum data from the sample of pressure in the interface into an artificial neural network trained to recognize patterns characterizing sleep disorder breathing, the artificial neural network producing an output for each sample of pressure input;

a

comparing the number of outputs indicating sleep disorder breathing to a selected threshold value, sleep disorder breathing being indicated if the number of outputs exceeds the threshold value; and

responsive indicated sleep disorder breathing, supplying pressurized gas to the patient's airway through the interface.

~~36~~ 26. (original) The method according to claim ~~35~~ 25 further including the step of obtaining a frequency spectrum from the measured respiration-related variables.

~~37~~ 27. (original) The method according to claim ~~36~~ 26 further comprising the step of:

normalizing the components of the frequency spectrum prior to inputting them into the artificial neural network.

~~38~~ 28. (currently amended) An apparatus for treatment of sleep disorder breathing comprising:

an ~~interfac~~ e<u>interface</u> for placement over a patient's airway, the interface coupled to a source of pressurized gas;

means for measuring respiration-related variables in the interface;

means for inputting cepstrum data from the respiration-related variables into an artificial neural network trained to recognize patterns characterizing sleep disorder breathing;

means for supplying pressurized gas to the patient's airway through the interface responsive to recognition by the artificial neural network of sleep disorder breathing.

~~39~~ 29. (original) The apparatus according to claim ~~38~~ 28 further comprising:

means for obtaining a frequency spectrum from the measured respiration-related variables.

~~40~~ 30. (original) The apparatus according to claim ~~38~~ 28 further comprising:

means for comparing a number of outputs of the artificial neural network over a selected interval to a selected threshold value and indicating sleep disorder

breathing only if the number of outputs of the artificial neural network indicative of sleep disorder breathing exceeds the selected threshold value.

31 ~~41~~. (original) The apparatus according to claim 28 ~~38~~ further comprising:

means for normalizing the measured respiration-related variables prior to inputting them into the artificial neural network.